

**SLOVENSKI STANDARD**  
**SIST EN 28378-2:1997****01-december-1997**

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**Information processing - Data interchange on 130 mm (5.25 in) flexible disk cartridges using modified frequency modulation recording at 7958 ftprad, 3,8 tpmm (96 tpi), on both sides - Part 2: Track format A (ISO 8378-2:1986)**

Information processing - Data interchange on 130 mm (5.25 in) flexible disk cartridges using modified frequency modulation recording at 7958 ftprad, 3,8 tpmm (96 tpi), on both sides - Part 2: Track format A (ISO 8378-2:1986, ed. 1)

**iTeh STANDARD PREVIEW**

Informationsverarbeitung - Datenaustausch auf 130 mm (5.25 in) Disketten mittels modifizierter Frequenzmodulationsaufzeichnung bei 7958 ftprad, 3,8 tpmm (96 tpi), auf beiden Seiten - Teil 2: Spurformat A (ISO 8378-2:1986, Ausg. 1)

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Traitement de l'information - Echange de données sur cartouches a disquette de 130 mm (5,25 in) utilisant un enregistrement a modulation de fréquence modifiée a 7958 ftprad, 3,8 tpmm (96 tpi), sur deux faces - Partie 2: Schéma de piste A (ISO 8378-2:1986, éd. 1)

**Ta slovenski standard je istoveten z: EN 28378-2:1989**

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**ICS:**

35.220.21      Magnetni diski      Magnetic disks

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 MINISTRSTVO ZA ZNANOST IN TEHNOLOGIJO  
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 PREVZET PO METODI RAZGLASITVE

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Key words: Data processing, information interchange, flexible disk cartridges, magnetic recording, frequency modulation, track format

### English version

Information processing. Data interchange on 130 mm (5.25 in) flexible disk cartridges using modified frequency modulation recording at 7 958 ftprad, 3,8 tpmm (96 tpi), on both sides. Part 2: Track format A (ISO 8378-2, 1st edition, 1986)

Traitement de l'information. Echange de données sur cartouches à disquette de 130 mm (5,25 in) utilisant un enregistrement à modulation de fréquence modifiée à 7 958 ftprad, 3,8 tpmm (96 tpi), sur deux faces. Partie 2: Schéma de piste A (ISO 8378-2, 1ère édition, 1986)	Informationsverarbeitung. Datenaustausch auf 130 mm (5.25 in) Disketten mittels modifizierter Frequenzmodulationsaufzeichnung bei 7 958 ftprad 3,8 tpmm (96 tpi), auf beiden Seiten. Teil 2: Spurformat A (ISO 8378-2, 1 Ausgabe, 1986)
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This European Standard was accepted by CEN on 1988-12-21 and is identical to the ISO standard as referred to. [SIST EN 28378-2:1997](http://standards.iteh.ai/standards/cen/28378-2-1997)  
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Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN Central Secretariat or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language may be translation under the responsibility of a CEN member into its own language and notified to CEN Central Secretariat has the same status as the official versions.

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CEN

European Committee for Standardization  
 Comité Européen de Normalisation  
 Europäisches Komitee für Normung

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Ref. No. EN 28 378-2:1989 E

### BRIEF HISTORY

The Technical Board has decided to submit the International Standard

ISO 8378-2, 1st edition 1986 "Information processing; Data interchange on 130 mm (5.25 in) flexible disk cartridges using modified frequency modulation recording at 7 958 ftprad, 3,8 tprad (96 tpi), on both sides; Part 2: Track format A"

to the formal vote. The result of this vote was positive.

For the time being, only the English and the French versions are available.

According to the CEN/CENELEC Common Rules, the following countries are bound to implement this standard: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxemburg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

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### STATEMENT

The text of the International Standard ISO 8378-2, 1st edition 1986, was approved by CEN as a European Standard without any modification.



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# International Standard



# 8378/2

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## Information processing — Data interchange on 130 mm (5.25 in) flexible disk cartridges using modified frequency modulation recording at 7 958 ftrpad, 3,8 tpmm (96 tpi), on both sides — Part 2: Track format A

**STANDARD PREVIEW**  
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*Traitement de l'information — Échange de données sur cartouches à disquette de 130 mm (5,25 in) utilisant un enregistrement à modulation de fréquence modifiée à 7 958 ftrpad, 3,8 tpmm (96 tpi), sur les deux faces — Partie 2: Schéma de piste A*

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UDC 681.327.63

Ref. No. ISO 8378/2-1986 (E)

**Descriptors:** data processing, information interchange, data recording devices, magnetic disks, flexible disks, track formats, specifications.

## Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work.

Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council. They are approved in accordance with ISO procedures requiring at least 75 % approval by the member bodies voting.

International Standard ISO 8378/2 was prepared by Technical Committee ISO/TC 97, *Information processing systems*.

Users should note that all International Standards undergo revision from time to time and that any reference made herein to any other International Standard implies its latest edition, unless otherwise stated.

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## Contents

	Page
<b>0</b> Introduction .....	1
<b>1</b> Scope and field of application .....	1
<b>2</b> Conformance .....	1
<b>3</b> References .....	1
<b>4</b> Track format .....	1
<b>4.1</b> General requirements .....	1
<b>4.2</b> Track layout after the first formatting for track 00, side 0 .....	3
<b>4.3</b> Track layout after the first formatting for all tracks other than track 00, side 0 .....	5
<b>4.4</b> Track layout of a recorded flexible disk for data interchange .....	6
<b>Annexes</b>	
<b>A</b> EDC implementation .....	9
<b>B</b> Procedure and equipment for measuring flux transition spacing .....	10
<b>C</b> Data separators for decoding MFM recording .....	13

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# Information processing — Data interchange on 130 mm (5.25 in) flexible disk cartridges using modified frequency modulation recording at 7 958 ftprad, 3,8 tpmm (96 tpi), on both sides —

## Part 2: Track format A

### 0 Introduction

ISO 8378 specifies the characteristics of 130 mm (5.25 in) flexible disk cartridges recorded at 7 958 ftprad, 3,8 tpmm (96 tpi), on both sides using modified frequency modulation (MFM) recording.

ISO 8378/1 specifies the dimensional, physical and magnetic characteristics of the cartridge so as to provide physical interchangeability between data processing systems.

ISO 8378/3 specifies an alternative track format for data interchange.

Together with the labelling scheme specified in ISO 7665, ISO 8378/1 and ISO 8378/2 provide for full data interchange between data processing systems.

### 1 Scope and field of application

This part of ISO 8378 specifies the quality of recorded signals, the track layout, and a track format to be used on 130 mm (5.25 in) flexible disk cartridges intended for data interchange between data processing systems.

NOTE — Numeric values in the SI and/or Imperial measurement system in this part of ISO 8378 may have been rounded off and therefore are consistent with, but not exactly equal to, each other. Either system may be used, but the two should be neither intermixed nor reconverted. The original design of this part of ISO 8378 was made using SI units.

### 2 Conformance

A flexible disk cartridge shall be in conformance with ISO 8378 when it meets all the requirements either of parts 1 and 2 or of parts 1 and 3 of ISO 8378.

### 3 References

ISO 646, *Information processing — ISO 7-bit coded character set for information interchange.*

ISO 2022, *Information processing — ISO 7-bit and 8-bit coded character sets — Code extension techniques.*

ISO 4873, *Information processing — ISO 8-bit code for information interchange — Structure and rules for implementation.*

ISO 7665, *Information processing — File structure and labelling of flexible disk cartridges for information interchange.*

ISO 8378, *Information processing — Data interchange on 130 mm (5.25 in) flexible disk cartridges using modified frequency modulation recording at 7 958 ftprad, 3,8 tpmm (96 tpi) on both sides —*

*Part 1: Dimensional, physical and magnetic characteristics.*

*Part 3: Track format B.*

### 4 Track format

#### 4.1 General requirements

##### 4.1.1 Mode of recording

###### 4.1.1.1 Track 00, side 0

The mode of recording shall be two-frequency where the start of every bit cell is a clock flux transition. A ONE is represented by a data flux transition between two clock flux transitions. Exceptions to this are defined in 4.1.12.

###### 4.1.1.2 All tracks other than track 00, side 0

The mode of recording shall be Modified Frequency Modulation (MFM) for which the conditions are

- a flux transition shall be written at the centre of each bit cell containing a ONE;
- a flux transition shall be written at each cell boundary between consecutive bit cells containing ZEROs.

Exceptions to this are defined in 4.1.12.

## ISO 8378/2-1986 (E)

**4.1.2 Track location tolerance of the recorded flexible disk cartridge**

The centrelines of the recorded tracks shall be within  $\pm 0,042 5$  mm (0.001 7 in) of the nominal positions, over the range of operating environment specified in ISO 8378/1.

**4.1.3 Recording offset angle**

At the instant of writing or reading a magnetic transition, the transition shall have an angle of  $0^\circ \pm 18'$  with the radius.

NOTE — As tracks may be written and overwritten at extremes of the tolerances given in 4.1.2 and 4.1.3, a band of old information may be left at one edge of the newly written data and would constitute unwanted noise when reading. It is, therefore, necessary to trim the edges of the tracks by erasure after writing.

**4.1.4 Density of recording**

**4.1.4.1** The nominal density of recording shall be 7 958 ftprad. The nominal bit cell length for track 00, side 0 is 251  $\mu$ rad, and for all the other tracks it is 125,7  $\mu$ rad.

**4.1.4.2** The long-term average bit cell length shall be the average bit cell length measured over a sector. It shall be within  $\pm 3,5$  % of the nominal bit cell length.

**4.1.4.3** The short-term average bit cell length, referred to a particular bit cell, shall be the average of the lengths of the preceding eight bit cells. It shall be within  $\pm 8$  % of the long-term average bit cell length.

**4.1.5 Flux transition spacing**

The instantaneous spacing between flux transitions may be influenced by the reading and writing process, the bit sequence recorded (pulse crowding effects), and other factors. The locations of the transitions are defined as the locations of the peaks in the signal when reading. Tests should be carried out using a peak-sensing amplifier.

**4.1.5.1** Flux transition spacing for track 00, side 0 (see figure 1).

**4.1.5.1.1** The spacing between two clock flux transitions surrounding a data flux transition or between two data flux transitions surrounding a clock flux transition shall be between 90 % and 140 % of the nominal bit cell length.

**4.1.5.1.2** The spacing between two clock flux transitions not surrounding a data flux transition or between two data flux transitions surrounding a missing clock flux transition shall be between 60 % and 110 % of the nominal bit cell length.

**4.1.5.1.3** The spacing between a data flux transition and the preceding clock flux transition (when not missing) or between a clock flux transition and the preceding data flux transition (when not missing) shall be between 45 % and 70 % of the nominal bit cell length.

**4.1.5.2** Flux transition spacing for all tracks other than track 00, side 0 (see figure 2).

**4.1.5.2.1** The spacing between the flux transitions in a sequence of ONEs shall be between 80 % and 120 % of the short-term average bit cell length.

**4.1.5.2.2** The spacing between the flux transition for a ONE and that between two ZEROs preceding or following it shall be between 130 % and 165 % of the short-term average bit cell length.

**4.1.5.2.3** The spacing between the two ONE flux transitions surrounding a ZERO bit cell shall lie between 185 % and 225 % of the short-term average bit cell length.

**4.1.6 Average signal amplitude**

For each side the average signal amplitude on any non-defective track (see ISO 8378/1) of the interchanged flexible disk cartridge shall be less than 160 % of  $SRA_{1f}$  and more than 40 % of  $SRA_{2f}$ .

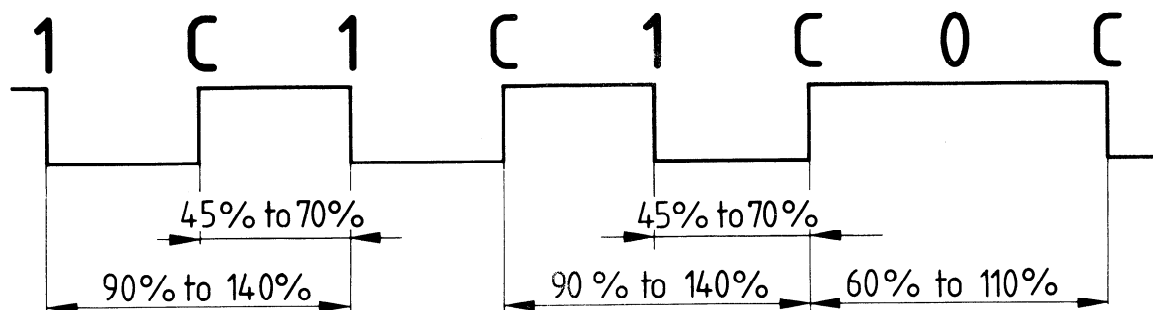


Figure 1

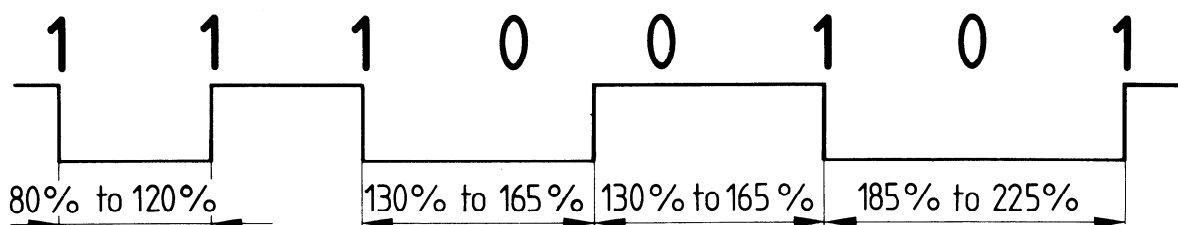


Figure 2

#### 4.1.7 Byte

A byte is a group of eight bit-positions, identified B1 to B8, with B8 the most significant and recorded first.

The bit in each position is a ZERO or a ONE.

#### 4.1.8 Sector

All tracks are divided into 16 sectors.

#### 4.1.9 Cylinder

A pair of tracks, one on each side, having the same track number.

#### 4.1.10 Cylinder number

The cylinder number shall be a two-digit number identical with the track number of the tracks of the cylinder.

#### 4.1.11 Data capacity of a track

The data capacity of track 00, side 0 shall be 2 048 bytes. The data capacity of all tracks other than track 00, side 0 shall be 4 096 bytes.

#### 4.1.12 Hexadecimal notation

Hexadecimal notation shall be used hereafter to denote the following bytes:

(00) for (B8 to B1) = 00000000

(01) for (B8 to B1) = 00000001

(FF) for (B8 to B1) = 11111111

(FE)\* for (B8 to B1) = 11111110

where the clock transitions of B6, B5 and B4 are missing

(FB)\* for (B8 to B1) = 11111011

where the clock transitions of B6, B5 and B4 are missing

(F8)\* for (B8 to B1) = 11111000

where the clock transitions of B6, B5 and B4 are missing

(4E) for (B8 to B1) = 01001110

(FE) for (B8 to B1) = 11111110

(FB) for (B8 to B1) = 11111011

(F8) for (B8 to B1) = 11111000

(A1)\* for (B8 to B1) = 10100001

where the boundary transition between B3 and B4 is missing.

#### 4.1.13 Error detection characters (EDC)

The two EDC-bytes are hardware generated by shifting serially the relevant bits, specified later for each part of the track through a 16-bit shift register described by

$$X^{16} + X^{12} + X^5 + 1$$

(See also annex A.)

#### 4.2 Track layout after the first formatting for track 00, side 0

After the first formatting, there shall be 16 usable sectors on the track. The layout of the track shall be as shown in figure 3.

During formatting the rotational speed of the disk, averaged index to index, shall be  $300 \pm 6$  r/min.

##### 4.2.1 Index gap

At nominal density, this field shall comprise 16 (FF)-bytes. Writing the index gap is started when the index hole is detected. Any of the first 8 bytes may be ill-defined due to subsequent overwriting.

##### 4.2.2 Sector identifier

This field shall be as given in table 1.

Table 1

Sector identifier						
Identifier mark		Address identifier				
		Track address		S		EDC
		C	Side	1 byte		
6 bytes (00)	1 byte (FE)	1 byte (00)	1 byte (00)	1 byte	1 byte (00)	2 bytes